Mecheleciv

VOLUME 21 OCTOBER 1962 No. 1

THE GEORGE WASHINGTON UNIVERSITY

OCTOBER 1962

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The Loop Course provides management personnel. Since it is our policy to promote from within, it is vital that competent men, well-grounded in our practices and policies, be available to fill management openings as they occur. And, due to Bethlehem's steady and continuing growth, there has been no lack of opportunities to advance.

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Preparing for Advancement

As the looper gains in ability, experience, and knowledge, and as openings occur, he is moved into positions of increasingly greater responsibility. The company expects and encourages the looper to produce . . . to make steady progress. Regular reports on his work and progress are made to department heads—and annual reports to divisional vice-presidents—throughout his career.

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Because of the nature of Bethlehem's activities, the greatest demand is for men with technical degrees, especially those in chemical, civil, electrical, industrial, mechanical, metallurgical, mining, and naval architecture and marine engineering.

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The eligibility requirements for the Loop Course, as well as how it operates, are more fully covered in our booklet, "Careers with Bethlehem Steel and the Loop Course." Copies are available in most college placement offices, or may be obtained by writing to Manager of Personnel, Bethlehem Steel Company, Bethlehem, Pa.

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BETHLEHEM STEEL

Editorial Page

For those students who have just entered The George Washington University, this is hardly an appropriate time for recollections. However, for the Mechelecivstaff this is not the case. Thinking about the shortcomings of last year's magazine and the mitigation or elimination of them provides ample food for thought. To make substantial improvements in this type of magazine, one must first describe its purpose. The purpose of Mechelecivmagazine is to provide a means of communication among students, an outlet for the propagation of noteworthy engineering ideas, and a facility to give engineers experience in communicating with other engineers.

A clearly defined purpose for Mechelecivmagazine greatly facilitates constructive criticism. Perhaps the greatest difficulty with last year's organization was a lack of singular responsibility. Giving one person the responsibility of seeing that the magazine is published in good journalistic form, on time, practically assures its accomplishment. The concept of having a board of editors where no one person has specific responsibility for the magazine is not a workable scheme. The same principle is evident in other jobs on the staff. If one competent person is responsible for a certain portion of the copy, he will submit it on time. If any person does not fulfill his responsibility, he can and should be replaced. In addition, the editors may invest more time in improving the quality of the magazine by allowing the staff to handle the routine jobs.

The old system discouraged interest on the staff level because merit promotion policy was nonexistent. The top six positions on the magazine were picked by various engineering societies usually without regard to previous Mechelecivexperience. It should be evident that this type of policy discouraged year after year participation on the staff.

The organizational structure of this year's magazine, which is shown to the left of the masthead, should obviate last years problems. The various departments are headed by people who are, with few exceptions, experienced in their type of work. Assistants have been appointed with the main consideration being that of providing an experienced nucleus for next year's staff. The departments are semi-autonomous thus giving them the authority required of their increased responsibility. However, the departments are responsible to the editor-in-chief in whom is vested the responsibility for the success or failure of the magazine.

Although the staff this year is large enough and is well-experienced, a considerable interest has been created in encouraging freshmen and sophomores to become staff members. The experience gained in this capacity will be invaluable during college and later in their chosen profession. Potential employers rely heavily on journalistic experience when considering for employment students with scientific backgrounds.

It should be the desire of every student to obtain a more diverse education by engaging in this type of activity. Those interested may contact any member of the Mechelecivstaff or leave their names and telephone numbers in the Mechelecivmailbox in the Davis-Hodgkins House.

—DLJ

Mechelectiv

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ENGINEERS' COUNCIL

Fellow students,

The Engineers' Council, the student governing body of the School of Engineering, has only one justification for its existence — that it is serving you, the student. This years' Council I know realizes its responsibility, both that which normally comes with an office of this kind and also the great financial obligation to wisely spend the $1.50 engineering fee which each of you pays. In order to properly fulfill these responsibilities, I feel that there must be a closer tie between the Council and the individual student. I am therefore writing this letter to inform you of what the Council has been doing in the past and to let you know of our plans for the future.

The biggest job the Council has, and that which takes the largest portion of your money, is publishing the Mecheleciv Magazine. This publication, handled entirely by the students, is printed six times during the school year. This year the magazine will contain more features which we hope will be of interest to more people. In this issue you will find special coverage of the organizations of your school, so that you can better understand their aims and the services each has to offer. The Editorial Page will be expanded to cover more and more current topics. The Campus News department will inform you of things that are happening throughout the entire university. A Calendar of Events will be published in each issue, and we hope arrangements can be made to print a schedule of job interview dates. We will, of course, continue to publish any article submitted by an engineering student.

The next largest responsibility of the Council is maintaining the Davis-Hodgkins House. This building, located at 731 22nd Street, is provided by the University for the use of all engineering students. In it are the offices of the Engineers' Council and those of all member organizations. For the individual student there is a lounge where he can eat lunch or otherwise meet his friends informally, and two study rooms equipped with blackboards and scratch paper. Unfortunately, the Engineers' Council cannot take credit for the large number, and willing nature, of the people in the D-H House who are always eager to help another student.

Over the summer, the D-H House was replastered and completely repainted. The floors were tiled and other major improvements were made. Most of the credit for this, however, must go to last year's Council.

In February, we will hold an open house. This project started from a one-day affair called Family Day. It was then expanded and, although it only lasted two days, it was called Engineers' Week. This year, it will last an entire week, February 18-23, 1963. But we have given it the more descriptive title, we hope, of Engineers' Open House.

The purpose of this activity is to acquaint the public, especially high school students, with engineering and with The George Washington University. To accomplish this, there will be tours, student projects, open classes and industrial and governmental exhibits. The Alumni Association has scheduled the Frank Howard Lectures for this week. The entire week's activities will be climaxed by the Engineers' Ball, the social event on the engineer's calendar.

Last year the Engineering School competed in the University intramural program. Although we did not take part in all sports we did very well in those that we did enter. I am sure there will be a much larger participation this year.

The Engineering School is a part of the entire University and should not be set apart, as there has been a tendency to do in the past. This year, the Engineers' Council has arranged for coverage in the University Freshman Handbook for itself and for all member organizations. Also, this year, several engineering activities will be listed on the University calendars. (Be sure to get one at registration or in the Book Store.) Another new service provided by your Council this year is the designing and purchasing of School of Engineering bookcovers and decals. These will be available at registration.

When I mentioned a tie between the individual student and the Council, I was referring to one that worked both ways. Just as the Council is interested in your desires, we hope that you will be interested in the Council, and will let us know how we may better serve you. So that you may do this more easily, a suggestion box has been placed in the north stairway under the large bulletin board. (Note: Be sure to watch this board for the minutes of Council meetings and for other important notices.) As a further effort to learn the feelings of the students, the Council prepared the questionnaire which you received with your registration material. I hope you will give it careful consideration, as all comments will be considered.

Again, let me say that I hope you will take an interest in your Engineers' Council. I am confident that, by working together, we will accomplish much towards improving our school and towards providing the types of programs and services you want.

Best of luck in school,

—Harvey J. Flatt
President

A short talk about a lifetime career

by Jim Bryce

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Jim Bryce has a lot going for him: a Bachelor of Chemical Engineering degree from Cornell, an excellent start on his Masters degree in Business Administration in Finance at Northwestern, and a solid career opportunity at American Oil. Right now, Jim's MBA work at Northwestern is being paid for (75%) by American Oil on their Advanced Education Plan.

Scores of ambitious and talented young men like Jim Bryce have been attracted to American Oil because of the wide range of research opportunities offered. American Oil is particularly interested in: Chemists—analytical, electrochemical, inorganic, physical, polymer, organic, and agricultural; Engineers—chemical, mechanical, metallurgical, and plastics; Masters in Business Administration with an engineering (preferably chemical) or science background; Mathematicians; Physicists.

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THETA TAU FRATERNITY

"Whatsoever thy hand findeth to do, do it with thy might." These few words reflect a philosophy of military strategists, doctors, financiers, lawyers, merchants, tradesmen, engineers; and of a fraternity — Theta Tau.

Theta Tau is a national professional engineering fraternity. The fraternity was founded at the University of Minnesota in 1904. Gamma Beta Chapter was inaugurated at The George Washington University on March 15, 1935 by the late Dr. Norman B. Ames. In memory of Deacon Ames, a most coveted award is made by the chapter each year to the engineering student most outstanding in Engineering School activities.

The purpose of Theta Tau is to promote a high standard of professional interest among student engineers, and to unite them in a strong bond of fraternal fellowship. As such, Theta Tau does not rival social fraternities, nor are membership requirements such that it competes with, or serves as, an academic honor society. The fraternity thus provides a middle road for friendly association with men of the same chosen profession. Membership itself is extended by invitation to those students who have successfully completed at least the freshman year, and who have no less than six months remaining prior to graduation. These students should have demonstrated themselves to be sociable and practical, and displayed an interest in fraternal ideals.

Gamma Beta Chapter of Theta Tau sponsors various activities for its members throughout the year. Among these are the fall and spring banquet and ball, fall shrimp feast, Christmas party, Memorial Day picnic, and brother-pledge mixers. The fraternity continues its activities during the summer with crab feasts and ocean beach trips. Since Theta Tau does not wish to overburden engineering students with social activities, it schedules less than twelve events per year. This keeps cost per member within reason, yet allows ample time for the development of fraternal friendships.

--Richard Singer, Regent

SIGMA TAU FRATERNITY

Sigma Tau, a national honorary engineering fraternity, has 28 chapters in universities throughout the country, and is a member of the Association of College Honor Societies. Xi Chapter was established at George Washington University on April 18, 1921.

The objectives of the fraternity are the recognition of personal attainment on the part of engineering students, provision for a working organization for promotion of leadership and interests of the engineering college and courses of study, and the encouragement of fellowship among colleagues in training for the engineering profession.

Membership is by invitation to engineering students having completed at least 70 credit hours of work, rank in scholarship among the upper third of all such students, and who possess further qualities of sociability and practicality.

One of the main contributions of Sigma Tau to students in the School of Engineering is through its Tutoring Committee. The Tutoring Committee exists for the purpose of aiding students in gaining greater proficiency and understanding in courses which might cause them difficulty. Students who are in need of help should call or contact the Tutoring Committee Chairman or any member of Sigma Tau. Help can be obtained in any course in the engineering curricula and there is no charge for this service.

Sigma Tau administers, scores and evaluates the Freshman Placement Examinations. The scores of these tests are compared with the student's grades throughout his college career. This examination process is intended to help the student to better understand his needs and to enable the school to be better prepared to meet these needs.

In order to encourage academic excellence, Sigma Tau awards a medal to the outstanding freshman student each year. This award is given to the freshman who has maintained the highest QPI for his first 36 semester hours at GWU.

ACTIVE MEMBERSHIP

Alonso, Carlos A.
Barnes, Laurence A.
Davis, Elton D.
Federline, James D.
Flatt, Harvey J.
Fox, Marvin H.
Gersten, Alvin
Hood, Fred E., Jr.
Hirsch, Robert B.
Horn, Carroll M.
Jacobson, Erling R.
Jones, Douglas L.
Kaminetzky, Lee**
Kavrukov, Ivan S.
Kohr, Daniel A.
Lee, Joong S.
Levitan, Marshall A.
McCalley, Robert D.
Miller, Donald A.
Peterson, Mendel L.
Ratra, Ajit S.
Rich, Stephen H.
Sanborn, Robert L.
Singer, Richard H.
Smith, Faith R., Miss
Spivak, Marvin J.
Stearns, Clifford B.
Treynor, Paul E.
Yee, Kenneth W.

**Chairman of Tutoring Committee

FACULTY MEMBERSHIP

Mason, Martin A., Dean of the School of Engineering
Walther, Carl H., Assistant Dean, School of Engineering
Cruickshanks, Benjamin C., Professor Emeritus
Feiker, Frederick M., Professor Emeritus
Abraham, George
Balwanz, William W.***
Ferris, Clifford D.***
Gilliland, Kitt E.
Golab, Thomas J.
Harris, Forest K.
Meltzer, Arnold C.
Rohlfs, Derrill C.
Wilkinson, Herbert S.

***Faculty Advisor

ASME

From left to right the section's officers are: Jerry Edwards-Program Chairman, Richard Singer-Vice Chairman, Robert Alvarez-Engineers' Council Representative, Millard Carr-Secretary, Reginald Mitchell-Treasurer, and Douglas Jones-Chairman.

The Student Branch of the American Society of Mechanical Engineers at The George Washington University has the avowed purpose of assisting its members in furthering their professional development. The society realizes this goal by propagating ideas pertinent to the mechanical engineering profession while consuming a minimum amount of its members time.

The advantages of membership are considerable and some of them warrant special mention. As soon as the $5.00 membership fee is paid, the student receives a one year subscription to Mechanical Engineering (the ASME technical magazine) which is in itself worth the total fee. In addition, the members receive coupons for free technical papers along with a membership card and pin. Student members in their senior year will receive "The Unwritten Laws of Engineering" and, just prior to graduation, a copy of the "Professional Guide for Junior Engineers." Special publications and technical papers of the society may be purchased at reduced price, and members may use the services of the Engineering Society's Library in New York at member's discount.

At the April meeting, student members participate in a technical paper contest. The total awards from the John A. Cannon Fund total $60.00 and are awarded to the best papers presented. In addition, members may compete for cash awards totaling $350.00 at regional meetings of the society. Several loan funds are available to students in need of such services.

Membership in the ASME Student Section is open to candidates for degrees of Mechanical Engineering and Bachelor of Science in Engineering. Meetings are held on the first Wednesday of each month from October to May. The meeting of October 3 will be a special meeting of all engineering organizations for the purpose of introducing freshmen and sophomores to the extracurricular activities available to them. The other regular meetings emphasize professional competence by providing speakers on timely engineering subjects.

Prior to graduation, student members are promoted to associate members without application or payment of an initiation fee. An associate member is encouraged to take an active part in the ASME section in which he is located. There are several divisions of the ASME which are suitably tailored to the diversity of interests of mechanical engineers. Membership in ASME helps in gaining early recognition in any chosen field of specialization and in continuing a professional education through contacts with established engineers.

AIEE - IRE

From left to right the section's officers are: Judy Popowsky-Vice Chairman, Don Miller-Engineers' Council Representative, Harvey Platt-Treasurer, Phil Kaplan-Secretary, Elliot Cohen-Chairman, and Professor Abraham-Adviser.

The American Institute of Electrical Engineers — Institute of Radio Engineers Joint Student Branch is a professional society which has the primary objective of acquainting electrical engineering students with the numerous branches of the electrical engineering profession.

This year's program has been specifically designed to appeal to the engineering freshman with a limited knowledge of highly technical material as well as to the more advanced students.

On October 3, the AIEE-IRE will participate in a mixer sponsored by all of the professional societies and the Engineers' Council. The mixer will give freshmen an opportunity to meet the upperclassmen and also many of the engineering professors.

In November, a demonstration will be given of the engineering school's digital computer, Flac II, which has recently been put into operation. The computer will be programmed in such a way that students can "ask it to solve problems."

The guest speaker for December is Mr. Norman Doctor of the Diamond Ordnance Fuze Laboratories. His talk on microminiaturization will be illustrated by movies and exhibits.

During the Spring Semester, Dr. Clifford Ferris of the engineering school staff will discuss his work in the comparatively new field of Bio-Medical Electronics. The club also hopes to have Dr. Jerome Weisner, the President's Special Advisor on Science speak at one of the spring semester meetings.

February 6 is Prize Paper Night. On this date, students are invited to present technical papers dealing with research they have done in electrical engineering. Winners of the school contest are entered in the National Contest where they are eligible for cash prizes and free trips.

The AIEE-IRE hopes that its meetings (on the first Wednesday of every month) will serve as a valuable supplement to the classroom instruction. Why not plan to attend every meeting?

ASCE

Nick Paleologos
Vice-Chairman

Allyn Kilsheimer
Chairman

Barry Blumberg
Secretary-Treasurer

Student chapters of the American Society of Civil Engineers are established to help civil engineering students enrich their college courses by beginning those professional contacts and associations which, continued through life, are so valuable to the practicing engineer.

The student scarcely needs to be told to master the principles and certain techniques of engineering because he knows he must pass these courses in order to graduate. There are other important subjects, however, not so capable of being expressed in formulas, that generally are called professional matters. They may or may not be covered in class work. Certain phases of these professional subjects are admirably adapted to programs of our student chapter.

The chapter also is a good medium for exercising principles of personal and public relations. For example, chapter members prepare, present, and discuss papers, conduct chapter activities, hold office, secure outside speakers, visit engineering works under construction, and make reports to the society.

All of these and many other activities under chapter auspices contribute to mental development and the forming of judgments. Activities also stimulate early professional consciousness while the student still is preoccupied with techniques.

The purpose of the chapter, then, is to help the student prepare himself for entry into the profession and the Society.

The student chapter of the American Society of Civil Engineers, here at George Washington University, provides the opportunity for the beginnings of professional associations. Membership in our chapter assures that contacts can be made with the technical and professional progress of civil engineering and with the leaders who are responsible for such progress. Even more important, membership offers the chance to take part in the constructive activities carried on by future leaders of the profession. The student chapter supplements regular class and laboratory work, and is the only agency that can relate the professional development of students to the achievements of the American Society of Civil Engineers.

Throughout the school year, organized conferences of student chapters in our region provide opportunity for broadening outlook and acquaintance. Sponsored by chapters, or groups of chapters, the conferences are held in cities or on campuses where adequate facilities are provided for both professional sessions and social activity. Other chapter conferences are held in October and February in connection with the National Conventions of the American Society of Civil Engineers.

Members of student chapters are welcomed at all meetings of the society. On a national level, regular conventions are held at various cities, combining technical, professional and social events. These are of special interest to students who recognize the importance of professional growth and contacts. At the local level, there are 74 local sections of the American Society of Civil Engineers throughout the United States and in Alaska, Brazil, Hawaii, etc. These sections hold frequent meetings, which members of student chapters are encouraged to attend. Many combined meetings are held between local sections and nearby student chapters. The society's publications are held in highest regard by the profession.

Chapter members may purchase an official membership badge. This badge, as well as the membership card, is recognized by engineers everywhere as tangible evidence of a student's serious intent to enter the civil engineering profession. The dues are merely $1.50 per semester to cover operating expenses.

Recognizing the fact that qualified graduates will want to become members of the parent chapter, American Society of Civil Engineers, special consideration is given to chapter members who apply and qualify shortly after graduation.

The American Society of Civil Engineers at George Washington University can be a stepping stone for your advancement in our field of civil engineering. Along with all the above mentioned opportunities, our chapter provides for freshmen, sophomores and juniors to be aided in their courses by seniors, such as myself. This is an opportunity you do not want to let get by you.

Watch the bulletin board for information on our first meeting. Our meetings are held on the first Wednesday of each month. Refreshments are served so be sure to attend.

SIGMA EPSILON

On May 4, 1960 the faculty of the School of Engineering of The George Washington University approved the establishment of an Engineering Honor Society. This organization was patterned after a chapter of the Tau Beta Pi Association. After a probationary period it was planned that this society would petition Tau Beta Pi for a charter.

The twenty charter members of this organization were selected by a group composed of faculty members of the School of Engineering. The first meeting was held on May 4. At this meeting officers were elected and a Constitution Committee was appointed. At the second meeting on May 12, the name, Sigma Epsilon, was selected and the constitution was approved. Also, since fourteen members were about to graduate, new officers were elected for the coming year, 1960-61.

Operating under its constitution Sigma Epsilon elected new members and held its first formal initiation on December 4, 1960. At this time six new men were brought into the society. The second initiation, April 30, 1961, brought five new members. The third initiation, on December 2, 1961 saw four men added to the membership, and the initiation of March 4, 1962 added five new members. The Society currently has eight active members. They are:

Erling Jacobsen, President
Francis Klisch, Vice President
Donald Eddins, Secretary-Treasurer
John Calarco
Harvey Flatt
Lee Kaminetzky
Donald Miller
Paul Treynor

Under the provisions of the current constitution, membership in the Society is confined to those male students in the School of Engineering who stand in the upper one eighth of the junior class or in the upper one fifth of the senior class. The purpose of the Society is the advancement of scholarship and professional integrity among the student body and to provide recognition for those students who exhibit these qualities to the highest degree. This avowed purpose does not allow Sigma Epsilon to restrict itself to a passive, "meet-once-a-year" role. Indeed, since its founding Sigma Epsilon has been concerned with initiating projects which reflect the purpose of the Society. Sigma Epsilon annually awards an engraved medal to the outstanding sophomore scholar in engineering. Each year the Society presents to the School of Engineering portraits and short biographies of outstanding men in the engineering sciences. Among those now on display in the corridors of Thompkins Hall are James Clerk Maxwell, Leonardo Euler, Heinrich Hertz, and Jean Fourier.

The members of the Society are currently considering ideas for many additional services to the University and the students. Any thoughts or suggestions would be warmly appreciated.

Sigma Epsilon is presenting its petition to Tau Beta Pi, the national engineering honor society, in October, after which we hope to be operating as the local chapter of Tau Beta Pi. This change in status is expected to broaden the scope of the Society, increase capability to provide services, and perhaps result in a social program geared to the needs and desires of the members. But regardless of any change or increase in activities or change of name, the purpose of Sigma Epsilon will remain the encouragement and recognition of scholarship and professional integrity among engineering students.

THE NOVEMBER REFERENDUM

This summer the Student Council passed two pieces of legislation that will go before the Student Body in the form of a referendum. It is hoped that this article will give the necessary information so that the student can make the proper decision when it is time to vote.

The first of this year's Student Council action was the proposed "Planning Commission" amendment to the articles of the Student Council Constitution. The function of this commission will be to undertake "by its own initiative," or by request of the Council, studies of problems affecting student interests. Its power will be derived from the Student Council itself. Membership will include representatives from the Activities Committee, Student Council, Omicron Delta Kappa, and Mortar Board. Four members chosen by the petition process and a Student Activities assistant from the Activities Committee will also be on the Commission. Thus, in effect, the Planning Commission will act as a subordinate staff agency to the Student Council and will report to the Council.

The second piece of legislature is the establishment of the Student Council elections in February. The following proposals have been adopted. The Student Council elections will take place during the first two weeks of the Spring semester and the members shall take office at the end of the election for a period of one year. And, the Student Governing Body of each school (i.e. Engineering School) or college shall have their representatives selected during the first two weeks of the Spring Semester.

While both of these proposals do not seem to have any immediate effect on the Engineering School, the student should have the facts on the proposals and not a biased or "padded" view from persons not completely aware of his sanctions.

MECH MISS

MARGRET WALTER

MECHELECIV STAFF

This month's Mech Miss is Margret Walter who comes to us from Hamburg, Germany. Margret is a senior majoring in American Thought and Civilization and, after graduation, she hopes to teach in Greece. Some of the activities that have kept her busy are being a feature writer for the Hatchet and working for the University Players. As you may have guessed, Margret is a member of the International Students Society.

TECH NEWS

Edited by Cliff Stearns

NBS RECRUITS SCIENTISTS FOR ANTARCTIC RESEARCH

The Boulder Laboratories of the National Bureau of Standards has opened its 1962-1963 campaign to recruit engineers and physicists to serve for 12-18 months in the Antarctic research program, which includes a short training period at Boulder.

Applications are now being considered since November is the summer season in the Antarctic and it is the time when rotation of personnel takes place. Those who have carried on polar projects for the past year will greet the newcomers -- break them in on their new jobs -- and turn important research projects over to them before returning to the United States.

NBS research projects in the Antarctic are a continuation of those which were begun during the International Geophysical Year (IGY), and will lead to the program known as the International Year of the Quiet Sun (IQSY). Conducted in coordination with the National Science Foundation, the Boulder Laboratories' projects are concerned chiefly with the measurements of electromagnetic phenomena, with the characteristics and behavior of the ionosphere, and with the effects of solar activities on radio transmissions.

The study of the electromagnetic geophysical phenomena of the polar regions is exciting and included are aurora, airglow, magnetism, very low frequency emission, riometry, micropulsations, radio noise, in addition to the ionosphere physics. In the Antarctic the land mass has provided permanent fixed locations for scientific stations, making possible the continuous study of the variables of nature without the complications caused by constantly changing position as in the case of Arctic stations located on the pack ice.

One of the principle instruments to be used in this study is a vertical incidence, sweep frequency, pulsed radar. Using this instrument, it is possible to determine certain characteristics of the upper atmosphere, including the heights and electron densities of the ionospheric layers. The data from each station are transmitted to the World Data Center in Boulder, where they are available to other research workers for analysis.

Positions are now open for qualified physicists, engineers, or experienced technicians prepared to spend twelve months in the Antarctic. Personnel who successfully pass the qualifying tests will be given a 30-90 day training period at Boulder Laboratories before departing for the Antarctic. Inquiries may be addressed to the PERSONNEL OFFICER, BOULDER LABORATORIES, NBS, BOULDER, COLORADO.

FREEZING SWAMPS TO MINE SALT

Three American firms are literally freezing a pathway down through 200 feet of Louisiana swamp ooze to tap a natural buried treasure estimated to be worth millions of dollars.

The treasure, a mushroom-shaped deposit geologically termed a "dome," is said to be so extensive that it can probably be mined for centuries to come. It's located at Belle Isle, a 165-acre islet in bayou country about 100 miles west of New Orleans.

The job consists of sinking a 16-foot diameter mine shaft into a massive salt deposit. However, a major challenge to this shaft sinking operation was the 200-foot deep layer of swampy soil covering the salt dome. This overburden, composed of organic matter and porous, fine-grained sand, proved to be so water saturated that crews using ordinary excavation techniques would be threatened constantly by flooding and cave-ins.

To remove this threat, engineers devised a way to solidify the soil by freezing a 34-foot diameter ice wall barrier around the shaft location. This greatly simplified actual shaft sinking, which consists of the progressive downward placement of steel forms and the pouring of a concrete liner.

--Continued on Page 23

Reflections of Telstar

Remember the picture above? It flashed across your television screen on a hot night last July. Perhaps you remember that it originated from France. And that it reached the U. S. via Telstar, the world's first private enterprise communications satellite.

Since that summer night, the Bell System's Telstar has relayed electronic signals of many types – television broadcasts, telephone calls, news photographs, and others.

But there's one Telstar reflection you might have missed. Look into the faces of the Bell System people below and you'll see it. It is the reflection of Telstar's success that glowed brightly on the faces of all who shared in the project.

Their engineering, administrative and operations skills created Telstar and are bringing its benefits down out of the clouds to your living room.

These Bell System people, through their talented, dedicated efforts, make your phone service still better, more economical, and more useful.

The reflections of Telstar are many.

Bell Telephone Companies

HOME CONSTRUCTION 1640 TO 1840

by WALLACE M. YATER, JR.

During the period 1640 to 1840 the water-powered sawmill was the only mechanical convenience most home builders had. This article has been written to give a greater understanding of and appreciation for the amount and kind of labor that went into the construction of a house in the years before the industrial revolution began to greatly change our lives.

Even though the early American and European builders were not bothered by many changes in their trade nor did they have to install wiring and central heating or make their houses meet building codes as today's builders do, do not think that building a house in 1700 was any easy matter, for a little familiarity with early construction will show that an early house was not only a man's greatest single investment but was produced by men who built with a philosophy that is now almost extinct. Whereas today's engineer thinks of his work as having a life of fifty or seventy-five years, the early home builder felt that his work would last at least several hundred years if not indefinitely with the proper maintenance, barring of course wreckers or fire.

The main reason for this attitude about construction is the great amount of hand-work that went into even a modest house. Every nail, every sash bar was made individually by craftsmen whose reputations were only as good as their work. The house was too dear in terms of human labor to be thought of as a replaceable unit.

Each piece was not only made individually by hand but was processed from raw material to finished product by the same men. The next thing the builder did after studying the plans was to go into the woods and decide which trees were to be tie beams, posts, rafters or joists. Only fine durable woods were considered - oak, elm, hickory, walnut - woods to resist the wear of generations of feet and the stresses of ten thousand storms.

Fig. 1. Illustration of log hewing; showing—Left, notches have been cut in log and intervening wood is split away; Center, rough wood left by split is smoothed with an adze prior to making the next split. Right, this same smoothing job as done with a broad ax. The first surface of the beam must be cut "by eye" while chalk lines on this and succeeding surfaces make it easier to keep the beam true. The beams being cut here are fourteen feet long and considered a good day's work for one man when tolerances are plus or minus one eighth of an inch.

These trees were felled and cut into the proper lengths by the long steady strokes of the two-man saw. Broad axes with a foot of steel blade and five pound adzes were used to hew the logs into house timbers. For the details of this operation see the photographs of log hewing in Fig. 1.

Since the timbers were put together and loaded green they sagged to some extent as they dried, but the early builder thoroughly understood this. He hewed beams to be loaded in bending with just enough curvature so that when installed and loaded, they sagged and became straight.

Once hewn the beams were slung under a huge axle with wheels twelve or more feet in diameter. As the back ends of the timbers dragged, oxen hauled them a few at a time to the job site.

The frame of the early house was a marvel of prefabricated construction. All of the beams were carefully mortised and tenoned according to plan. Whole walls and roof trusses were fitted together and pegged on the ground. Then in one day the entire frame was erected being raised a wall at a time on a low stone foundation. At this time only a few additional pegs were needed to hold the sections together. Since a house-raising usually required additional hands it was apt to be a festive social occasion. A look at the framing diagram, Figure 2, will give an idea as to how the finished frame looked.

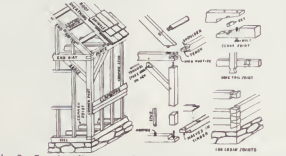

Fig. 2. Framing diagram; Left, Typical frame of an early American house. Center, expanded view of frame showing the joints. Right, other joints commonly used in houses as well as the log cabin joint.

—Continued on Page 20

2000 mph airliner...another engineering challenge!

On the drawing boards of aircraft engineers, plans are taking shape for a supersonic passenger jet – one that will fly from New York to London in just over 2 hours, at Mach-3 speeds of 2000 m.p.h. or more. The delta-shaped transport, flying at altitudes up to 80,000 feet, would make today's fastest airliners seem as pokey as stagecoaches. And what size! Perhaps two hundred feet from nose to tail. Three stories tall.

Through the intensive research of the metallurgical engineer will come a metal for the skin of this mighty airliner. One that will be able to withstand critically high temperatures – up to 630°F – caused by supersonic speeds.

Challenging? An engineering career, such as metallurgy, is full of challenges. Whether it's exciting, new designs for a supersonic airliner, a gas-turbined car, a nuclear-powered ship, you'll be at work in a stimulating profession – one with room for advancement – one that promotes progress and economic growth.

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JOHN VAN NOSTRAND DORR

CHEMICAL ENGINEERING PIONEER

by Donald A. Miller

John Van Nostrand Dorr of New York City and Washington, Conn., chemical engineering pioneer, died June 29, in his ninety-first year, at the Gaylord Hospital in Wallingford, Conn. His professional life was one to be emulated, if not in actual deed, certainly in quality of achievement.

Mr. Dorr is credited with early applying chemical engineering principles to extractive metallurgy and generally with hastening the transition from intermittent to continuous operation, thus facilitating mass production in many industries. He added the words "thickener" and "classifier" to the engineer's vocabulary.

Chemical Engineering magazine in 1949 said editorially, "The contributions which his inventions . . . have made to mankind are probably greater than those of any other chemical or metallurgical engineer of our times."

Born in Newark, N. J. on January 6, 1872, he was the son of John Van Nostrand and Nancy Higginson Dorr. He received his early education at a private school conducted by his mother.

At seventeen he went to work for Thomas A. Edison at the West Orange, N. J. Laboratory, becoming one of the "Edison Pioneers". Throughout his life Mr. Dorr often spoke of the Old Man's guiding philosophy of "pluck, tenacity, and determined perseverance". He was himself well-known for the zest with which he applied these qualities to every challenge of his career. Needing more technical education, he went to Rutgers University, graduating in 1894.

In the following years he worked as chemist, assayer and metallurgist at mining and milling companies in the Black Hills of South Dakota and in Colorado. Here, at the turn of the century, he had to extract enough gold from a small marginal ore body to keep going a small cyanide mill of his design, into which he and his associates had put about their last cent, eked out by a loan from a mineworkers union. However, this crude equipment and processing, improvised to avert flat failure, were to make a revolutionary change from batch to continuous processing. Experiments at the insignificant cyaniding mill in a Black Hills gulch proved practical a method for continuous separation and chemical treatment of fine solids suspended in liquids in a wide range of industries.

In Denver in 1907, Mr. Dorr opened an office to market his inventions. There, in 1910, he founded the Dorr Cyanide Machinery Company. His first New York office, opened on Church Street in 1913, was followed by formal incorporation of The Dorr Company in 1916 — and for some 35 years New York was the center of his world-wide activities. Mr. Dorr became founder-chairman of Dorr-Oliver Incorporated, with international headquarters at Stamford, Conn., in 1955, when his company merged with Oliver United Filters of E. L. Oliver (1878-1955). He resigned from active participation on the Board only within the past year.

His philosophy, that "the knowledge a man wins goes into a common store; the inventions he makes go into world-wide use", resulted in the spread of his machines and processes to Europe, Africa and other countries as early as 1910. He established subsidiary companies in London, Paris, and Berlin in the early '20's, well ahead of the general trend.

Mr. Dorr was among the first to recognize the value of a "laboratory in the country". In 1917 he purchased an old grist mill on 50 acres in Westport, Conn. Expanded and modernized, the Westport Mill is today an internationally famous center for a world-wide program of engineering research and development.

Mr. Dorr's outside interests ranged widely beyond his extensive role in world industry. He pioneered programs and investigations of geriatrics, education, public safety and the arts. The Dorr foundation, which he established in 1940, supported a variety of these projects. Through it he contributed toward advanced educational facilities at Rutgers University, South Dakota School of Mines and other educational centers in the U. S. and abroad. He long provided scholarships and financial aid to deserving students.

In 1957 Mr. Dorr backed an innovation in U. S. education to establish a Pre-College Science Center at the Loomis School in Windsor, Conn., a project which preceded the National

—Continued on Page 22

CIVIL ENGINEERS:

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The mortise and tenon joint was preferred over the now familiar bolted joint for several reasons. In the first place bolts and nails being hand-made were very expensive. Secondly since the timbers were erected green and shrank as they dried over a period of ten or twelve years the bolts would have loosened up becoming around three eights of an inch per foot too long. But, the mortise and tenon shrank together so that the joint would always be tight in such a way that the tenon could not slide along the peg in the mortise. However, since shrinkage allowed the tenon to rotate more and more on the peg, many key joints were braced to prevent tenon rotation as well as to give added wind resistance to the entire structure. For the details of making this joint see Figure 3.

Fig. 3. Making the mortise and tenon joint. Top row left to right, tenon is sawed, split, adzed and trued with a chisel. Second row left, mortise is bored and chiseled out. Right, sharp corners are planed off of the tenon and it is tried in the mortise. Not shown is an adzing operation like the one shown above where the tenon is made slightly smaller to fit the mortise. Third row, left, peg is smoothed in stages with a hatchet, drawknife and spoke shave. Right per hole is drilled and peg is driven in. This whole operation does not take more than about two hours.

As these large framing beams were hewn only a few inches of wood under the bark were ever taken off. This left the first growth of the tree running right through the center of the beam with the consequences that as the beam dried, cracks developed radiating from the center to the surface. All species of timber develop these radial cracks for two reasons. First as a log dries and shrinks, it shrinks more around the circumference, than along the radii. Hence it must crack. Second since the wood dries from the surface, the surface wood will shrink while the central wood is still green causing the surface to crack. This surface drying will even cause large beams with no central wood that are seasoned too fast to crack, but as the central wood dries these cracks will close up again.

Since cracking reduces the wood's resistance to bending, the carpenter of 1840 used beams large by today's standards so that the structure would still be amply strong after all the cracks had developed and all the mortises had been cut. In fact some old beams are as deep as fourteen inches, as long as forty feet and weigh as much as two thousand pounds.

While on this discussion of seasoning and cracking a note or two about another timber problem might be added. Green wood is very susceptible to decay. When a log is cut the wood will remain alive for a period of time ranging from a few weeks to almost a year. The length of this live period depends on the species of timber and is increased by cutting the logs long, painting the ends, and exposure to cold weather. However as soon as the wood dies the first stages of decay take over rapidly in a matter of a few weeks and the log is no longer sound. For this reason the early builder always hewed his timbers soon after felling and got them installed under roof as soon as possible, because the green timbers if left in the rain would start to decay in eight or ten weeks. Since the seasoning period for wood is a year for each inch of thickness and many beams were twelve or more inches thick, it was for practical construction time considerations that the finished house served as a seasoning shed for its own timbers in spite of the settling.

Even though the carpenter could not waste time until the roof was on he was never in too big a hurry to skip over the details that meant quality work, for once the frame was completed and ready for roofing the carpenter placed a straight edge across the rafters and hewed down any high one so that the roof load would be borne uniformly. This same procedure was repeated on all other parts of the frame that were to be boarded or lathed.

The frame thus trued was covered with products from the local sawmill - clapboards for the outside walls, boards fourteen or more inches wide for the floors, shingle lath for the roof and the smaller plaster lath for inside walls and ceilings.

On a trip to the sawmill you would see three or four six-foot-long blades mounted a board thickness apart in a large frame which rode up and down as the log on a carriage slowly advanced. After twenty minutes or more of sawing, clean, newly exposed boards would fall away to be eagerly inspected by the sawyer who was always sharpening his almost uncanny skill of recognizing hidden defects in logs by simply examining the outside of them.

A look under the sawing floor would reveal that the power was coming to the mill from a

—Continued on Page 22

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water wheel through a system of wood and iron gears which appear deceptively crude, but the smooth rumbling sound of the mill would tell you that the working surfaces of all the machinery were perfectly true and that no gears were out of round or not indexed properly. Since all the machinery was made by hand unimportant surfaces were left rough and bore the mark of adz, saw and hammer, but no pains were spared on the working surfaces of gear teeth and axles which if faulty would wreck other parts of the machinery.

Even though the mill did the work of sawing, it was the carpenter who had to plane by hand trim and floor boards. He even had to chisel the backs of over-thickness boards where they crossed a beam in order to get a uniform floor.

Board planing and thicknessing was just the beginning of the handwork that went into an early house. Ten mortise and tenon and sixteen panel joints had to be made during the construction of a four-panel door. A good day's work and then some, with a brace and bit, saw, chisel and planes, but it was done and had to be. There was no other way. Not only doors but windows, stairs, and a thousand other parts of the house, from the chimney cap to the footings, were taken from the raw material to the finished product, a chip at a time with simple hand tools.

Although home construction technique changed a little from 1640 to 1840 and a great deal from one part of the country to another, most of the procedures described here were followed quite closely, with the frame of hewn beams mortised and tenoned together always present in one form or another even in the floors and roofs of log cabins. In later years, however, smaller sawed beams replaced the big hewn ones but were still mortised together. These sawed timbers are common in Victorian buildings.

Although new improvements were slow in the early days there were always new methods and labor-saving devices appearing in the home building industry, but it was around the time of the Civil War that a great flood of new developments began a change that was to transform the home building industry into its present form. The machine-made nail and the power planer were just a beginning that would lead to the factory made sash and frame, tarred felt, plywood, hand power saw and even whole factory-made prefabricated houses.

Special acknowledgement goes to Richard C. Hall and William S. Stafford for photography.

Science Foundation's extensive program in this field. Through his Foundation Mr. Dorr took an interest in a similar center at Bridgeport University. The Council for Pre-College Science Education, a group sponsored by the Dorr Foundation, helped promote an effort to upgrade science education in cooperation with the Connecticut Science Teachers Association.

Mr. Dorr pioneered a one-man campaign in 1953 to promote traffic safety by painting a right shoulder guide line on public highways. The President's Committee for Traffic Safety in 1955 recommended its use as a standard marker on U.S. highways in addition to the center line, after tests proved an appreciable reduction in accidents and in right shoulder highway maintenance. Its use has spread widely abroad.

Mr. Dorr was the author of "Cyanidation and Concentration of Gold and Silver Ores" (McGraw Hill, 1936) (Revised 1950). He wrote over 65 articles and papers on a wide variety of technical subjects.

Mr. Dorr was a devoted Life Trustee of Rutgers University. He was active in many professional chemical and metallurgical societies. His fraternal memberships included Phi Beta Kappa, Tau Beta Pi, Phi Lambda Upsilon, and Zeta Psi (National President, 1931).

His achievements won him world-wide recognition, including the highest awards of the chemical, mining and engineering professions. He received honorary doctorate degrees from Rutgers, Columbia, Polytechnic Institute of Brooklyn, and the Michigan, South Dakota and Colorado Schools of Mines. The career of the distinguished inventor and philanthropist is recorded in American Men of Science and Who's Who in Engineering, as well as in Who's Who in America. Significantly, the name of Dorr now appears in the Second Edition of Webster's New International Dictionary and in Webster's Biographical Dictionary (G. & C. Merriam Co.).

Surviving are his wife, Mrs. Virginia Nell Dorr; a daughter, Mrs. Malcolm Oakes, and a brother, Goldthwaite H. Dorr, both of New York City; four step-children; and several grandchildren and great-grandchildren.

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TECH NEWS — Continued from Page 14

Freezing is accomplished by circulating calcium chloride brine at minus 33 degrees Fahrenheit through an intricate network of steel tubing and casing set in 30 holes surrounding the mine shaft and drilled 250 feet through the overburden.

A two-stage 80-ton ammonia refrigeration system was installed at the job site to produce the sub-zero brine. This is circulated into the ground through 2-inch steel tubing, set inside 6-inch steel casing, each 7500 feet in total length. When the brine reaches the bottom of each freeze hole, it is returned to the surface through the casing for recirculation.

ENGINEERS' MIXER

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Friends and Family Welcome

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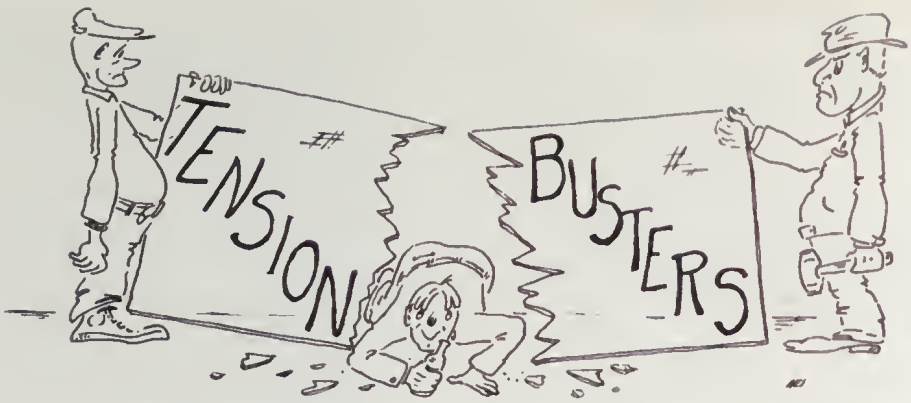


"What's a pack of sheep?"
"A flock", the boy replied.
"What's a pack of buffalo?" was the next question.
"A herd" was the answer.
"What's a pack of camels?"
"Thirty cents", came the reply.

Thermometers aren't the only things that are graduated and get degrees without having any brains.

After four platters of roast beef, twelve orders of french fries, three cups of coffee and half an apple pie, the customer ordered another dinner. The waiter amazed said: "Excuse me for saying so, sir, but you certainly enjoy your meals".
"As a matter of fact", answered the stuffed diner," I hate food -- but I'm crazy about bicarbonate of soda".

"Who was that lady I saw you with?"
"That was no lady. That was my brother. He only walks that way".

"What is it doc?" asked the M.E. expectantly. The doctor shook his head sadly. "Too little blood in your alcohol stream".

Tell me, said the E.E. to the vain coed. "Has anyone ever told you how wonderful you are."
She blushed a little and said coyly. "Why no, I don't think anyone ever has."
"Then tell me something else," he went on. "Just how and where did you ever get the idea?"

Freshman: "I don't want to scare you, prof, but Pop says someone is going to get it if my grades don't go up.

The E. E. spent three weeks repairing the cuckoo clock. Now every hour on the hour the cuckoo comes out sideways and says "Anybody know what time it is?"

"Grandma, were you in Noah's ark?"
"Of course not"
"Then why didn't you drown."

One tonsil to another, "It is so dark in here, I don't know where I am".
"We must be in Capistrano, here comes another swallow."

M. E. calling Salvation Army: Do you collect bad girls?
"Yes we do"
M. E. "Save me one".

An old devoted couple agreed to communicate with each other should one of them die. As is usually the case, the old man died first leaving the bereaved widow scurrying to the seance parlor. After a number of unsuccessful attempts at reaching her husband, the widow finally got through to him. "John, John, is that you John?"
"Yes my love."
"John, tell me how it is up there."
"Well, it is very peaceful, and there are acres and acres of grass."
"John, I didn't know there was any grass in heaven."
"Mary, who said anything about heaven, I am a bull in Montana."

That Internal Revenue -- man! you just got to hand it to them...

A girl was driving in her new car when something went wrong with the engine. The traffic light changed from green to red and back to green and still she couldn't get the car to budge. Soon a traffic cop came up.
"What's the matter, miss?" he inquired. "Ain't we got colors you like?"

First Engineer: "Say, is Sally's dress torn, or am I seeing things?"
Second Engineer: "Both, brother, both!"

Overheard in a fraternity house: "All a sweater does for her is make her itch."

Engineer: "I dreamed of you last night."
Coed: (coldly) "Really!"
Engineer: "Yes, then I woke up, shut the window, and put on an extra blanket."

Whistler, the famous painter, was exasperated when he came home from work one night and found his mother sitting in the middle of the living room floor.
"What's the matter, Ma?" he demanded. "You off your rocker?"

Father: "Why do you go out with that girl?"
Son: "Because I want to."
Father: (suspiciously): "Want to what?"

He: Do you think kissing is unhealthy?
She: I dunno, I never...
He: You've never been kissed?
She: I've never been sick.

Definition of a wolf: ready, villain, and able.

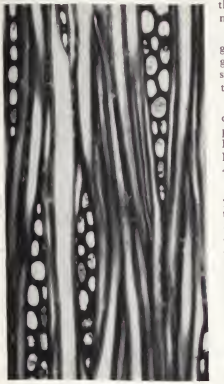
"Oh, Dear, I've missed you so much." Then she raised the revolver and tried again.

The instructor held the chisel against the rusted bolt. He looked at the ME students and said "When I nod my head you hit it."
They're burying him today.

Kodak beyond the snapshot...

(random notes)

What makes hickory the way it is



This photomicrograph shows the basic structure of hickory wood. It was taken on a plain, ordinary microscope with a BROWNIE Camera. For details on this use of BROWNIE Cameras, request a copy of "Photomicrography with Simple Cameras" from Eastman Kodak Company, Sales Service Division, Rochester 4, N.Y. Everybody knows what a BROWNIE Camera is.

Huntley with rope

May we please plant a little spore in the brain intended to grow into a career not previously contemplated?

Sound, businesslike outfits need well-grounded engineers to run their photographic operations. This doesn't necessarily mean making the candid shots at the boss's daughter's wedding.

We have made a 42-minute movie called "Photography at work . . . a progress report." (To show it, write Eastman Kodak Company, Professional Photographic Sales Division, Rochester 4, N.Y.)

Mr. Chet Huntley narrates. We take you inside a cake being baked in Dayton. We puzzle you with a monstrous camera intended to take pictures in Cincinnati without perspective. We show you how they test a new hydrofoil on Lake Washington and what nooks and crannies a camera can explore when fitted with fiber optics. We take you to lots of places, starting on a classy note with the hunt for anti-matter at Brookhaven.

If we create the impression that the great linear accelerator there is nothing but another camera accessory, do not conclude that perspective is being shunned in Rochester as well as in Cincinnati. There is a "low technology" that civilizations evolve over the millennia for hewing the wood and drawing the water of everyday life and a "high technology" that is called into existence by the demands of pure science and then very kindly lowers a rope to haul up the "low technology". Maybe 1520 feet of movie film is better than rope.

The improvement of capacitors

Our polyester is different from other polyester. We add a cyclohexane ring to the unit structure, whereas other polyester is just poly(ethylene terephthalate). The added ring protects against moisture, raises the melting point, and gives customers some reasons of self-interest to seek out the trademarks KODEL on polyester fiber and TENITE on polyester molding granules.

When the president of Kodak visited the lab where, in addition, its electrical advantages were discovered, we set up ten .05-μfd 200-v polyester capacitors for him, identical except that five had the ring and five didn't. We put them all in an oven at 185°C and applied 700 volts of dc across them. Within 3 minutes all five of the p(e t)'s had shorted out. This was the logical moment for the president to leave, but realism is company policy. The president wanted to watch the first of ours fail. It took 10 minutes. That was four years ago.

We then replaced 15 of the regular capacitors in a TV set with our kind and set it to running 9 hours a day, 7 days a week. All other components that failed we replaced. For the Electrical Insulation Show early this year, we removed the set from the room where the lab manager hides it and took it to Washington. It was the hit of the show. The coincidence that it happened to be the only TV set in the hall on the day when the first American was orbiting the earth might have helped focus attention on it. It would not have been a good place for a capacitor to blow.

MAKING CHEAP THINGS WORK WELL IS A GOOD LIFE.

SOPHISTICATED TECHNICAL PERSUASION IS A GOOD LIFE.

THE GOOD LIFE IS NOT ALWAYS FILLED WITH TENSION.

Plenty of lively work at Kodak research-ing, engineering, producing, and market-ing all sorts of things.

EASTMAN KODAK COMPANY
Rochester 4, N.Y.

An interview with General Electric's W. Scott Hill

Manager—Engineering Recruiting

One of a series . . .

How to Make the Most of Your First Five Years

MR. HILL has managerial responsibility for General Electric's college recruiting activities for engineers, scientists, PhD's and technicians for the engineering function of the Company. Long active in technical personnel development within General Electric, he also serves as vice president of the Engineers' Council for Professional Development, board member of the Engineering Manpower Commission, director of the Engineering Societies Personnel Service and as an officer or member of a variety of technical societies.

Q. Mr. Hill, I've heard that my first five years in industry may be the most critical of my career. Do you agree?

A. Definitely. It is during this stage that you'll be sharpening your career objectives, broadening your knowledge and experience, finding your place in professional practice and developing work and study habits that you may follow throughout your career. It's a period fraught with challenge and opportunity—and possible pitfalls.

Recognizing the importance of this period, the Engineers' Council for Professional Development has published an excellent kit of material for young engineers. It is titled "Your First 5 Years." I would strongly recommend you obtain a copy.*

Q. What can I do to make best use of these important years?

A. First of all, be sure that the company you join provides ample opportunity for professional development during this critical phase of your career.

Then, develop a planned, organized personal development program—tailored to your own strengths, weaknesses and aspirations—to make the most of these opportunities. This, of course, calls for a critical self appraisal, and periodic reappraisals. You will find an extremely useful guide for this purpose in the "First 5 Years" kit I just mentioned.

Q. How does General Electric encourage self development during this period?

A. In many ways. Because we recognize professional self-development as a never-ending process, we encourage technical employees to continue their education not only during their early years but throughout their careers.

We do this through a variety of programs and incentives. General Electric's Tuition Refund Program, for example, provides up to 100% reimbursement for tuition and fees incurred for graduate study. Another enables the selected graduate with proper qualifications to obtain a master's degree, tuition free, while earning up to 75% of his full-time salary. These programs are supplemented by a wide range of technical and nontechnical in-plant courses conducted at the graduate level by recognized Company experts.

Frequent personal appraisals and encouragement for participation in professional societies are still other ways in which G.E. assists professional employees to develop their full potential.

Q. What about training programs? Just how valuable are they to the young engineer?

A. Quite valuable, generally. But there are exceptions. Many seniors and graduate students, for example, already have clearly defined career goals and professional interests and demonstrated abilities in a specific field. In such cases, direct placement in a specific position may be the better alternative.

Training programs, on the other hand, provide the opportunity to gain valuable on-the-job experience in several fields while broadening your base of knowledge through related course study. This kind of training enables you to bring your career objectives into sharp focus and provides a solid foundation for your development, whether your interests tend toward specialization or management. This is particularly true in a highly diversified company like General Electric where young technical graduates are exposed to many facets of engineering and to a variety of product areas.

Q. What types of training programs does your company offer, Mr. Hill?

A. General Electric conducts a number of them. Those attracting the majority of technical graduates are the Engineering and Science, Technical Marketing and Manufacturing Training Programs. Each includes on-the-job experience on full-time rotating assignments supplemented by a formal study curriculum.

Q. You mentioned professional societies. Do you feel there is any advantage in joining early in your career?

A. I do indeed. In fact, I would recommend you join a student chapter on your campus now if you haven't already done so.

Professional societies offer the young engineer many opportunities to expand his fund of knowledge through association with leaders in his profession, to gain recognition in his field, and to make a real contribution to his profession. Because General Electric benefits directly, the Company often helps defray expenses incurred by professional employees engaged in the activities of these organizations.

Q. Is there anything I can do now to better prepare myself for the transition from college campus to industry?

A. There are many things, naturally, most of which you are already doing in the course of your education.

But there is one important area you may be overlooking. I would suggest you recognize now that your job—whatever it is—is going to be made easier by the ability to communicate . . . effectively. Learn to sell yourself and your ideas. Our own experience at General Electric—and industry-wide surveys as well—indicates that the lack of this ability can be one of the major shortcomings of young technical graduates.

**The kit "Your First 5 Years," published by the Engineers' Council for Professional Development, normally sells for $2.00. While our limited supply lasts, however, you may obtain a copy by simply writing General Electric Company, Section 699-04, Schenectady, New York.*

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